

LISTING OF THE CLAIMS

This listing of claims will replace all prior versions, and listings, of claims in the application:

Claims 1-4 (canceled).

5. (previously presented) A substrate processing apparatus comprising:

- (a) a substrate holding part to hold a substrate in its substantially horizontal position;
- (b) a rotary part to rotate a substrate held by said substrate holding part in a substantially horizontal plane;
- (c) a processing liquid supply part to selectively supply a plurality of types of processing liquids to a substrate held by said substrate holding part;
- (d) a plurality of guide parts of substantially annulus ring shape that receives a processing liquid flying spattering from a substrate in rotation, on the side of a substrate held by said substrate holding part;
 - each guide part comprising:
 - (d-1) a first processing liquid guide part to receive pure water flying spattering from a substrate in rotation; and
 - (d-2) a plurality of second processing liquid guide parts that are stacked in multistage on said first processing liquid guide part and receive a second processing liquid flying spattering from a substrate in rotation;
- (e) a plurality of processing liquid passages of substantially annulus ring shape that are provided to said plurality of guide parts in one-to-one correspondence and feed downwardly a processing liquid introduced from their corresponding guide parts; and
- (f) a position adjusting part to adjust the physical relationship between said substrate held by said substrate holding part and each of said guide parts, such that a processing liquid flying spattering from a substrate in rotation is received by a guide part corresponding to the recovery type of the processing liquid;
- (g) a plurality of first recovery tanks of doughnut-like shape corresponding to said second processing liquid guide parts so as to recover, through said processing liquid passages, a

second processing liquid flying spattering from said substrate by rotation;

(h) a plurality of storage parts that are located separately below said plurality of first recovery tanks so as to correspond to said plurality of first recovery tanks, respectively, each storage part including:

(h-1) a storage tank having a doughnut-like shape that is approximately the same as internal space shape of the corresponding said first recovery tank; and

(h-2) a plurality of pipes to connect in communication at a plurality of locations between the bottom of said corresponding said first recovery tank and the inside of said storage tank;

(i) a second recovery tank corresponding to said first processing liquid guide part so as to recover, through a processing liquid passage, said pure water flying spattering from said substrate by rotation; and

(j) a discharge pipe through which said pure water recovered in said second recovery tank is discharged and discarded to the exterior, and wherein an outer guard forming at least the lowermost second processing liquid guide part in said plurality of second processing liquid guide parts includes:

a first cylindrical part arranged coaxially with said substrate holding part;

an inclined part extending obliquely downwardly toward said substrate holding part from the lower end of said first cylindrical part; and

a second cylindrical part extending vertically downwardly from the lower end of said inclined part; and

an internal diameter of said first cylindrical part forming the lowermost second processing liquid guide part in said plurality of second processing liquid guide parts is greater than an internal diameter of said second cylindrical part forming a processing liquid passage corresponding to said lowermost second processing liquid guide part, and said storage tanks contained in each of said plurality of storage parts are stacked one upon another substantially vertically.

Claims 6-13 (canceled).

14. (previously presented) A substrate processing apparatus comprising:
- (a) a substrate holding part to hold a substrate in its substantially horizontal position;
 - (b) a rotary part to rotate said substrate held by said substrate holding part in a substantially horizontal plane;
 - (c) a processing liquid supply part to selectively supply a plurality of types of processing liquids to said substrate held by said substrate holding part;
 - (d) a plurality of guide parts of substantially annulus ring shape that receives a processing liquid flying spattering from a substrate in rotation on the side of said substrate held by said substrate holding part;
each guide part comprising:
 - (d-1) a pure water guide part to receive pure water flying spattering from a substrate in rotation; and
 - (d-2) a plurality of chemical solution guide parts that are stacked in multistage on said pure water guide part and receive a chemical solution flying spattering from a substrate in rotation;
 - (e) a plurality of processing liquid passages of substantially cylindrical shape that are provided to said plurality of guide parts in one-to-one correspondence and feed downwardly processing liquids introduced from their corresponding guide parts; and
 - (f) a position adjusting part to adjust the physical relationship between said substrate held by said substrate holding part and said guide parts, such that a processing liquid flying spattering from a substrate in rotation is received by a guide part corresponding to the recovery type of the processing liquid,
 - (g) a plurality of first recovery tanks of doughnut-like shape corresponding to said chemical solution guide parts so as to recover, through said processing liquid passages, a chemical solution flying spattering from said substrate by rotation;
 - (h) a plurality of storage parts that are located separately below said plurality of first recovery tanks so as to correspond to said plurality of first recovery tanks, respectively, each storage part including:
 - (h-1) a storage tank having a doughnut-like shape that is approximately the same as shape of the corresponding said first recovery tank; and

(h-2) a plurality of pipes to connect in communication at a plurality of locations between the bottom of said corresponding said first recovery tank and the inside of said storage tank;

(i) a second recovery tank corresponding to said pure water guide part so as to recover, through said processing liquid passages, said pure water flying spattering from said substrate by rotation; and

(j) a discharge pipe through which said pure water recovered in said second recovery tank is discharged and discarded to the exterior, and wherein an outer guard forming at least the lowermost chemical solution guide part in said plurality of chemical solution guide parts includes:

a first cylindrical part arranged coaxially with said substrate holding part;

an inclined part extending obliquely downwardly toward said substrate holding part from the tower end of said first cylindrical part; and

a second cylindrical part extending vertically downwardly from the lower end of said inclined part; and

said lowermost chemical solution guide part is disposed such that said inclined part forming the lowermost chemical solution guide part is positioned above an outer cylindrical part forming a processing liquid passage that corresponds to the chemical solution guide part immediately overlying the lowermost chemical solution guide part, and said storage tanks contained in each of said plurality of storage parts are stacked one upon another substantially vertically.

Claims 15-22 (canceled).

23. (previously presented) A substrate processing apparatus to perform a predetermined substrate processing by supplying a processing liquid to a substrate while rotating the substrate, comprising:

(a) a substrate holding part to hold a substrate in its substantially horizontal position;

(b) a rotary part to rotate said substrate held by said substrate holding part in a substantially horizontal plane;

(c) a processing liquid supply part to selectively supply a plurality of types of processing liquids to a substrate held by said substrate holding part;

(d) a four-stage splash guard that is disposed so as to annularly circumscribe a substrate held by said substrate holding part and is composed of a first guard, second guard, third guard and fourth guard arranged in inner-to-outer order; and wherein in a vertical direction, an inside of said first guard, a space between said first and second guards, a space between said second and third guards, and a space between said third and fourth guards serve as a first guide part, second guide part, third guide part and fourth guide part, respectively,

in a horizontal direction, the inside of said first guard, the space between said first and second guards, the space between said second and third guards, and the space between said third and fourth guards serve as a first processing liquid passage, second processing liquid passage, third processing liquid passage and fourth processing liquid passage, respectively;

(e) a lifting part to lift and lower said splash guard substantially vertically,

(f) a plurality of first recovery tanks of doughnut-like shape that correspond to said second, third and fourth processing liquid passages and recover a second processing liquid flying spattering from said substrate by rotation,

(g) a plurality of storage parts that are located separately below said plurality of first recovery tanks so as to correspond to said plurality of first recovery tanks, respectively, each storage part including:

(g-1) a storage tank having a doughnut-like shape that is approximately the same as shape of the corresponding said first recovery tank; and

(g-2) a plurality of pipes to connect in communication at a plurality of locations between the bottom of said corresponding said first recovery tank and the inside of said storage tank;

(h) a second recovery tank that corresponds to said first guard and recovers said first processing liquid flying spattering from said substrate by rotation; and

(i) a discharge pipe through which said first processing liquid recovered in said second recovery tank is discharged and discarded to the exterior, and wherein said second guard includes:

a first cylindrical part arranged coaxially with said substrate holding part;

a projected part projecting obliquely upwardly toward said substrate holding part from the upper end of said first cylindrical part;

an inclined part extending obliquely downwardly toward said substrate holding part from the lower end of said first cylindrical part; and

a second cylindrical part extending vertically downwardly from the lower end of said inclined part,

said second guard is curved such that the internal diameter of said first cylindrical part forming said second guide part is greater than the internal diameter of said second cylindrical part forming said second processing liquid passage,

said first guard receives a first processing liquid flying spattering from a substrate in rotation,

said second, third and fourth guards receive a second processing liquid flying spattering from a substrate in rotation,

said first processing liquid is pure water and said second processing liquid is a chemical solution, and said storage tanks contained in each of said plurality of storage parts are stacked one upon another substantially vertically.

Claims 24-27 (canceled).

28. (currently amended) A substrate processing apparatus to perform a predetermined substrate processing by supplying a processing liquid to a substrate while rotating said substrate, comprising:

(a) a substrate holding part to hold a substrate in its substantially horizontal position;
(b) a rotary part to rotate a substrate held by said substrate holding part in a substantially horizontal plane;

(c) a processing liquid supply part to selectively supply a plurality of types of processing liquids to a substrate held by said substrate holding part;

(d) a four-stage splash guard that is disposed so as to annularly circumscribe a substrate held by said substrate holding part and is composed of a first guard, second guard, third guard and fourth guard arranged in inner-to-outer order; and

(e) a lifting part to lift and lower said splash guard substantially vertically; and
(f) a plurality of recovery tanks to store a processing liquid received at said splash guard, and wherein

in a vertical direction, an inside of said first guard, a space between said first and second guards, a space between said second and third guard, and a space between said third and fourth guards serve as a first guide part, second guide part, third guide part and fourth guide part, respectively,

in a horizontal direction, the inside of said first guard, the space between said first and second guards, the space between said second and third guard, and the space between said third and fourth guards serve as a first processing liquid passage, second processing liquid passage, third processing liquid passage and fourth processing liquid passage, respectively,

said second guard includes:

a first cylindrical part arranged coaxially with said substrate holding part;

a first projected part projecting obliquely upwardly toward said substrate holding part from the upper end of said first cylindrical part;

an inclined part extending obliquely downwardly toward said substrate holding part from the lower end of said first cylindrical part;

a second cylindrical part extending vertically downwardly from the lower end of said inclined part; and

a fifth cylindrical part branching ~~outwardly from said second cylindrical~~ a middle of said inclined part and extending vertically downwardly ~~from the lower end of said inclined part,~~

said third guard includes:

a third cylindrical part arranged coaxially with said substrate holding part;

a second projected part projecting obliquely upwardly toward said substrate holding part from the upper end of said third cylindrical part; and

a fourth cylindrical part that is provided fixedly so as to branch from the internal wall surface of said third cylindrical part and is disposed closer to said substrate holding part than said third cylindrical part,

said second processing liquid passage is formed by inside of said first guard and said second cylindrical part of said second guard,

said third processing liquid passage is formed by said fifth cylindrical part of said second guard and said fourth cylindrical part of said third guard,

said second guard is curved such that said inclined part ~~forming of~~ said second guard ~~guide part~~ is positioned above said fourth cylindrical part ~~forming of~~ said third guard ~~processing liquid passage~~,

said first guard receives a first processing liquid flying spattering from a substrate in rotation,

said second, third and fourth guards receive a second processing liquid flying spattering from a substrate in rotation, [[and]]

said second processing liquid passage and said third processing liquid passage are inserted into a discharged liquid tank corresponding to a lifting movement of said lifting part,

further, said first guide part is a pure water guide part to receive pure water flying spattering from a substrate in rotation, and

said second, third and fourth guide parts are chemical solution guide parts to receive a chemical solution flying spattering from a substrate in rotation.

29. (previously presented) The substrate processing apparatus according to claim 28, wherein said first processing liquid is pure water and said second processing liquid is a chemical solution.

30. (previously presented) The substrate processing apparatus according to claim 29, wherein disposed are said plurality of recovery tanks have a plurality of first recovery tanks of doughnut-like shape that correspond to said second, third and fourth processing liquid passages and recover a second processing liquid flying spattering from said substrate by rotation, said apparatus further comprising:

(g) a plurality of storage parts that are located separately below said plurality of first recovery tanks so as to correspond to said plurality of first recovery tanks, respectively, each storage part including:

(g-1) a storage tank having a doughnut-like shape that is approximately the same as shape of the corresponding said first recovery tank; and

(g-2) a plurality of pipes to connect in communication at a plurality of locations between the bottom of said corresponding said first recovery tank and the inside of said storage tank.

31. (previously presented) The substrate processing apparatus according to claim 30, wherein said plurality of recovery tanks have a second recovery tank that corresponds to said first guard and recovers said first processing liquid flying spattering from said substrate by rotation, said apparatus further comprising:

(h) a discharge pipe through which said first processing liquid recovered in said second recovery tank is discharged and discarded to the exterior.

32. (previously presented) A substrate processing apparatus to perform a predetermined substrate processing by supplying a processing liquid to a substrate while rotating said substrate, comprising:

(a) a substrate holding part to hold a substrate in its substantially horizontal position;
(b) a rotary part to rotate a substrate held by said substrate holding part in a substantially horizontal plane;

(c) a processing liquid supply part to selectively supply a plurality of types of processing liquids to a substrate held by said substrate holding part;

(d) a four-stage splash guard that is disposed so as to annularly circumscribe a substrate held by said substrate holding part and is composed of a first guard, second guard, third guard and fourth guard arranged in inner-to-outer order; and wherein in a vertical direction, an inside of said first guard, a space between said first and second guards, a space between said second and third guards, and a space between said third and fourth guards serve as a first guide part, second guide part, third guide part and fourth guide part, respectively,

in a horizontal direction, the inside of said first guard, the space between said first and second guards, the space between said second and third guards, and the space between said third and fourth guards serve as a first processing liquid passage, second processing liquid passage, third processing liquid passage and fourth processing liquid passage, respectively;

(e) a lifting part to lift and lower said splash guard substantially vertically, and

wherein

(f) a plurality of first recovery tanks that correspond to said second, third and fourth processing liquid passages and recover a second processing liquid flying spattering from said substrate by rotation,

(g) a plurality of storage parts that are located separately below said plurality of first recovery tanks so as to correspond to said plurality of first recovery tanks, respectively, each storage part including:

(g-1) a storage tank having a doughnut-like shape that is approximately the same as shape of the corresponding said first recovery tank; and

(g-2) a plurality of pipes to connect in communication at a plurality of locations between the bottom of said corresponding said first recovery tank and the inside of said storage tank;

(h) a second recovery tank that corresponds to said first guard and recovers said first processing liquid flying spattering from said substrate by rotation; and

(i) a discharge pipe through which said first processing liquid recovered in said second recovery tank is discharged and discarded to the exterior, and wherein said second guard includes:

a first cylindrical part arranged coaxially with said substrate holding part;

a first projected part projecting obliquely upwardly toward said substrate holding part from the upper end of said first cylindrical part;

an inclined part extending obliquely downwardly toward said substrate holding part from the lower end of said first cylindrical part; and

a second cylindrical part extending vertically downwardly from the lower end of said inclined part; and

said third guard includes:

a third cylindrical part arranged coaxially with said substrate holding part;

a second projected part projecting obliquely upwardly toward said substrate holding part from the upper end of said third cylindrical part; and

a fourth cylindrical part that is provided fixedly so as to branch from the internal wall surface of said third cylindrical part and is disposed closer to said substrate holding part than said

third cylindrical part,

said second guard is curved such that said inclined part forming said second guide part is positioned above said fourth cylindrical part forming said third processing liquid passage,

said first guard receives a first processing liquid flying spattering from a substrate in rotation,

said second, third and fourth guards receive a second processing liquid flying spattering from a substrate in rotation,

said first processing liquid is pure water and said second processing liquid is a chemical solution, and said storage tanks contained in each of said plurality of storage parts are stacked one upon another substantially vertically.

33. (previously presented) The substrate processing apparatus according to claim 28, further comprising:

(h) a discharge nozzle that has a discharge port disposed in said first guard and discharges said first processing liquid from said discharge port to said substrate holding part.

34. (previously presented) The substrate processing apparatus according to claim 33, wherein said first guard is located at a position lower than the lowermost one of said second, third and fourth guards.

35. (previously presented) The substrate processing apparatus according to claim 28, wherein said first guard includes:

a liquid passage that is formed in said first guard and connected in communication to said processing liquid supply part; and

a discharge nozzle that is disposed on the inner peripheral surface side of said first guard and discharges said first processing liquid supplied from said processing liquid supply part to said substrate holding part via said liquid passage connected in communication.

36. (original) The substrate processing apparatus according to claim 35, further comprising:

(i) a pipe that is disposed below said liquid passage and moves relatively with respect to said liquid passage; and

(j) a relay pipe to provide communication between said liquid passage and said pipe, said relay pipe being flexibly disposed.